

CoilMaster “Through the Eye” Coil Packaging System

The CoilMaster packaging system represents a major advance in the packaging of steel and aluminium coils with the application of microchip technology and innovative engineering.

It is an automatically operated system that uses a heavy gauge stretch film for the wrapping of coils. The concept used is for a specifically shaped track to carry a film dispensing shuttle through the eye of the coil, while the coil is slowly rotated on its axis on a set of blocker rollers (Fig 1). The complete body of the coil is, therefore sealed by a cocoon of stretch film. Ancillary protective packaging can be incorporated into the system.

The system can be tailored to wrap almost any size of coil; it is flexible in terms of location requirements. It can remain stationary with coils presented by crane, C-hook or truck to a mobile coil car that traverses into a packaging station. Coils can also be brought to the station by walking beam, coil car or conveyor. The system can also move in and out, positioning itself alongside a packing station, or mounted on an overhead crane track or on floor rails enabling the system to move to several stations. Blocker rolls are incorporated into the packaging station and can be either stationary or mobile as well.



Fig 1
Through The Eye CoilMaster
Wrapping system

CoilMaster is proven technology for wrapping coils axially through the eye.

Developed originally by KC Metal Products and BHP in Australia, this system is now manufactured and marketed throughout the World by Signode CoilMaster, and its licensees in North America and Japan.

Concept

The package concept is an integral part of the CoilMaster design. The system puts a tight layer of film over all surfaces of the coil. This tight layer of film eliminates most of the air from the package. By reducing the amount of air in the package, the potential for moisture to form is reduced, thereby reducing the possibility of corrosion or water spots.

The ancillary packaging is then applied. This packaging may include inside diameter protectors, outside diameter protectors, side wall protectors or belly wrap material. This material can be applied manually or its application can be integrated into the system to be applied automatically. This ancillary packaging protects both the coil and the first layer of film. The ancillary product can be made from plastics to maintain a completely recyclable package.

A second layer of film is then applied. The second layer of film holds the ancillary package in place and further protects the inner airtight layer of film.

Since the two layers are applied separately and the ancillary material is in between, the outer layer may be torn from handling damage but the inner layer remains intact and thus the coil stays sealed and protected. Also, since the first layer of film is tight if, any condensation forms, it is either between the layers or on the outside layer. In either case, the moisture does not penetrate through the first layer. Also, since the entire coil is sealed in a waterproof package, any external moisture runs off the package.

System Design

To achieve this process, the CoilMaster has two heavy-duty, opposing, C-shaped track sections that, when closed, provide the guide for the film-dispensing shuttle (Fig. 1). These are arranged to be adjustable in the vertical plane to accommodate basically all coil diameters and are mounted so that the two half-sections may be separated to allow the coil to be positioned. The C-frames are opened and closed using screw jack actuators.

The film dispensing shuttle is designed to drive itself around the track (rack and pinion system) at a speed up to 4.2 m/s. Power is delivered to the track through conductor rails. A 50/60-Hz motor is mounted on the shuttle. The stretch film is drawn off the film roller through a film accumulation and conditioning system, thereby applying stretch film to all points of the coil at an even tension. The film is a heavy gauge, linear low-density polyethylene stretch film specifically designed for this application. A VCI chemical additive to prevent corrosion is incorporated into the film in the extrusion process.

The blocker rolls, which are polyurethane covered, are electrically driven through a reducer and chain and sprocket, utilizing a frequency inverter to Control the speed. Blocker rolls can also be hydraulically driven.

Machine control system

A Programmable Logic Controller (PLC) controls the system. The PLC allows a variety of wrapping programs to be programmed according to the wrap profile required, including fully automated or manual controls for all operations. Different film overlaps or number of laps required can be programmed, depending on the pack requirements.

The system can be operated by one operator utilizing a user-friendly, menu driven, touch-screen panel. The operator panel also houses E-Stop and lockout controls.

The system is programmed with a self-diagnostic package. Should a fault occur, it will be identified on the operator control panel.

System features

The system incorporates features that include:

- Automatic coil diameter scanning system. Coil diameter is measured prior to wrapping using a sonar-scanning device. This information is processed through the PLC to determine the required blocker roll speed to apply the desired overlap of film. A ± 10 -v signal is then sent to the blocker rolls to drive them at the appropriate speed.
- Automatic film cutter/clamp system. This system automatically cuts the film at the end of a wrap cycle and holds it clamped in until the start of the new cycle. When the wrap cycle starts, the film is held in the clamps until the first lap is wrapped in and then the film tail is automatically released. The cutter clamp system uses pneumatic pressure and requires clean dry air at 80 psi.
- Coil Scan system to monitor clear eye and track. Electronic eyes, prior to and during the wrap process, scan the eye of the coil and the track for any obstructions. Should an obstruction be detected, the system will not operate and a fault will be displayed on the control screen.
- Automatic film breakage or exhaustion detector. If there is a film break or the roll of film is exhausted, the shuttle will stop going around the track and will return to and park in its home position. A fault will be displayed on the control panel.
- Automatic shuttle change for film breakage or exhaustion. This is an option that will automatically replace the shuttle with the broken or exhausted roll of film with another shuttle housing a new roll of film. The wrap process then continues where it left off.

Maintenance

The system is designed to be essentially maintenance-free. A spare shuttle is recommended with each system. The shuttles are designed with wearable parts such as the pinion gear, guide wheels and brushes. These parts are easily changeable. It takes under three minutes to change the shuttle on the system. The spare shuttle can be used on the system while the other shuttle is overhauled. By following this preventative maintenance schedule on a regular basis, the system experiences virtually no downtime.

System Benefits

The system benefits include:

- Can wrap almost any size coil,
- 100% open eye.
- Package can be handled, stored, loaded and unloaded in the horizontal position using traditional handling devices, or it can be downloaded onto a pallet.
- Superior protection against corrosion.
- Low oil usage.
- Facilitates shipping by rail.

- Relatively low labor for packaging.
- Potential to eliminate eye bands.
- Flexibility in system design.
- Environmentally friendly package that can be unwrapped in under a minute, and the material is recyclable.
- Increased yield from coils for customers.
- Safer work environment resulting in fewer injuries.

Summary

CoilMaster is proven technology for wrapping coils axially through the eye. Coils are loaded onto driven blocker rolls, scanned to measure the diameter, and data sent to a PLC. The wrapping process is then executed with the touch of a button. The wrapper opens to accept the coil and then closes forming a continuous circuit through the eye of the coil. A shuttle device travels around the circuit through the eye of the coil at the same time the coil is rotated on its axis. A film is dispensed by the shuttle thereby sealing the entire body of the coil. One operator can control the process using a user-friendly PLC and graphic display with self-diagnostic software. Secondary packaging materials can be integrated with the system.

Benefits include 100% open eye, superior protection against corrosion, potential for reduced usage of oils and elimination of eye bands, increased ability to ship via rail, increased yield for customers, reduced labor for packaging, safer work environment, ability to unpack-age in under one minute, and recyclable packaging material.